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TRANSPORTATION SAFETY (ROAD SAFETY)

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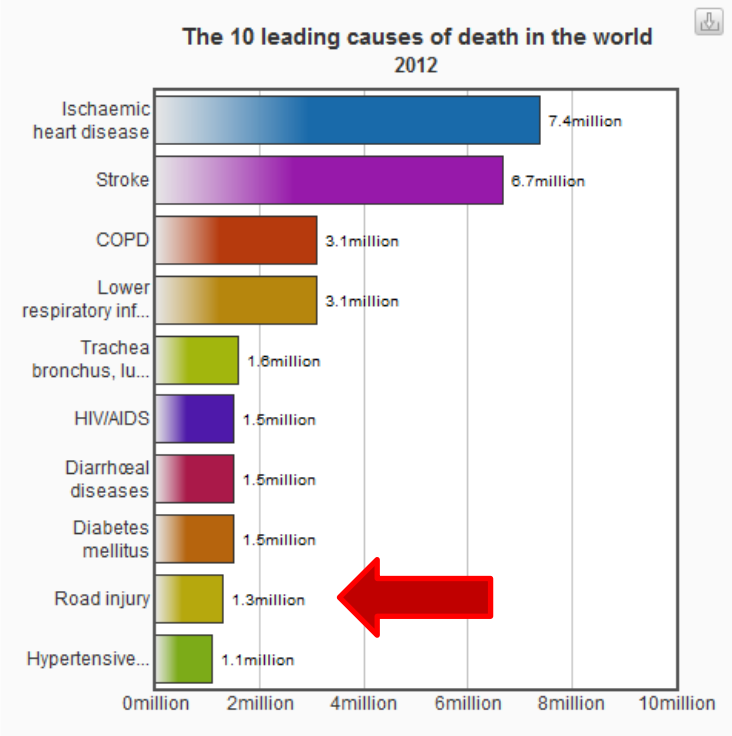
Introduction and Background



World Health Organization (WHO)

Every year
1.24 Million people are
killed worldwide
because of road trauma

Expecting to be among top 5 leading causes of death until 2020

Transportation Safety

- The Magnitude (Fatalities in 2010 - WHO):
  - Worldwide: 1.24 Million
  - Country Level:
    - Developed Countries: Canada: 2,227 Germany: 3,648 Netherlands: 640 UK: 1905 **US: 33,808**
    - Developing Countries: **Iran: 23,249** Iraq: 5,708 Pakistan: 5,192 **India: 133,938** Senegal: 213
  - Australia: 1,363
    - Queensland: 250 (TMR - Queensland Government)
    - Victoria: 288 (Victoria Government)
    - NSW: 405 (Transport for NSW - Centre for Road Safety)

Transportation Safety

- Vehicular Crashes
- Vulnerable Users (Pedestrians and Cyclists)
- Train Crashes

- Rear-end\Angel\Head-on\ …

- Males\Females

- Fatalities\Major Injuries\Minor Injuries\PDO

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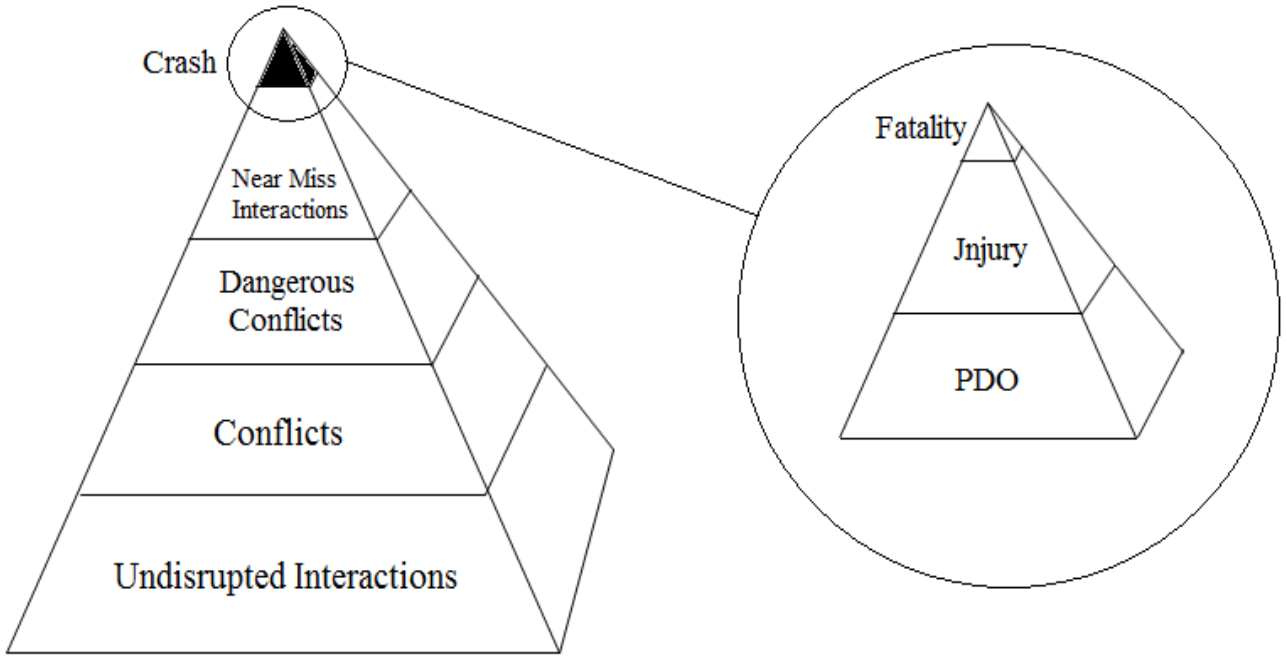
- Indicators of Road Safety (Un-safety)(Risk):



Transportation Safety

- Analytical Approaches to Tackle Road Safety:

- Approach it from Psychological Perspective (CARRS-Q)
- Approach it from Statistical and Econometrics Perspective
- Approach it from Intelligent Transportation Systems (ITS) Perspective
- Other Analytical Approaches …

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- Analytical Approaches to Tackle Road Safety:

- Approach it from Psychological Perspective (CARRS-Q)
- Gorilla Example:

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- Approach it from Statistical and Econometrics Perspective

Transportation Safety

- Analytical Approaches to Tackle Road Safety:

- Approach it from Psychological Perspective (CARRS-Q)
- Approach it from Statistical and Econometrics Perspective
- Approach it from Intelligent Transportation Systems (ITS) Perspective:
- https://www.youtube.com/watch?v=AKhcTt-hyWE

Afghari, A. P., Ismail, K., Saunier, N., Sharma, A., & Miranda-Moreno, L. (2014). Pedestrian-cyclist interactions at bus stops along segregated bike paths: a case study of Montreal.

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Montreal – Cote Saint Catherine Corridor

Transportation Safety

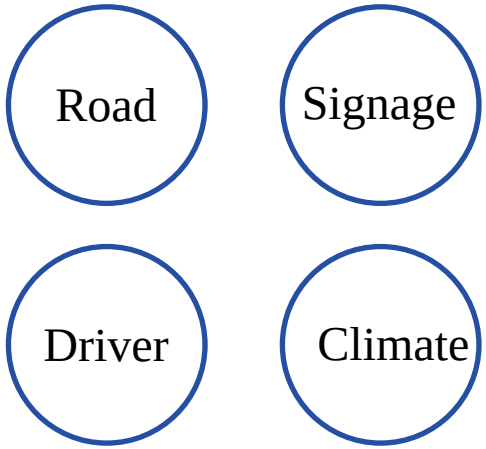
- Approach it from Statistical and Econometrics Perspective

- Very Simple Words:

$$\text{Number of Crashes } (Y) = f(X_1, X_2, X_3, ..., X_n)$$

Use it as the Indicator of Safety (un-safety)(Risk)

Crash Causal Factors (Crash Contributing Factors)



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- Approach it from Statistical and Econometrics Perspective

- Very Simple Words:

Number of Crashes (Y) = $f(X_1, X_2, X_3, ..., X_n)$

We call this Modelling as we try to build a mathematical model which can represent the real world mechanisms

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We call this Modelling as we try to build a mathematical model which can represent the real world mechanisms:

1- Choice Modelling (to model the choice of individuals based on its causes)

2- Regression Modelling (to model a dependant variable based on its causes)

3- Probability Modelling (to model an outcome based on its causes)

Etc.

At the end, it is all about **CAUSAL RELATIONSHIPS**

X causes Y (they are correlated in a causal relationship)

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CAUSAL RELATIONSHIPS

$Y = \beta \times X$

Crash Count = β × Speed

Automatic Vehicle Preference = β × Income

Probability of choosing Bus = β × Price

$\beta = 2$

$\beta = -3$

$\beta = 0$

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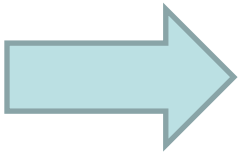
CAUSAL RELATIONSHIPS

$$Y = \beta \times X$$

Y	X
2	6
11	65
3	33
7	22
43	22
23	1
0	12



β

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(Have you ever been in a causal relationship?)

Thank You For Your Attention

Questions ?